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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/821,100	04/07/2004	Zhong Dong	M-15295 US	8965

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EXAMINER
VU, DAVID

ART UNIT	PAPER NUMBER
2818	

DATE MAILED: 06/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/821,100	DONG ET AL.	
	Examiner	Art Unit	
	DAVID VU	2818	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 March 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 21-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-15 and 21-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-15 and 21-23 are rejected under 35 U.S.C. 103 (a) as being unpatentable over You et al. (US Pat. 6,706,613, hereinafter You) in view of Wang et al. (US 2005/0110102, hereinafter Wang).

Regarding claims 1-11, 15 and 21-23, You discloses in figs. 2B-2C a method of forming sidewall dielectric on an ONO-type memory cell stack where at least one sidewall of the ONO-type memory cell stack 108 includes a plurality of exposed material layers respectively composed of different materials, the method comprising subjecting the sidewall 120a to a

thermal oxide process to form a sidewall oxide (fig. 2C and col. 5, lines 29-37) and forming an supplemental nitride sidewall dielectric after the rapid oxidation process (col. 7, lines 58-67).

You fails to disclose forming the sidewall oxide layer by hydrogen and oxygen. However, Wang teaches that the sidewall oxide layer is formed by a dry ISSG process at a temperature is about 800-1000°C, the flow rate of H_2+O_2 is about 1slm –40slm {See **[0032]**; **[0038]** and **[0041]**}, the pressure is about 1-20 Torr, the duration is about 30-120 seconds **[0046]**; the ratio of H_2/H_2+O_2 is in the range about 0.1%-40%, therefore, the ratio H_2: O_2 is about 0.01 (Let x be H_2, y be O_2; x+y = 100% = 1 and x/(x+y) = 0.1; we got x:y = 0.01). It would have been obvious to one with ordinary skill in the art at the time of the invention to form an oxide film by using a dry ISSG process as taught by Wang in the process of You. As recognized by one skilled in the art, a dry ISSG process provides excellent thickness control and the thermal budget can be reduced (Abstract).

Note that the dry ISSG process is often described as a process generates short lived oxygen radicals {See Xing et al. (US 20030124873) ([**0026**]-[**0038**]) for evidence of the state of the art in which atomic oxygen is created by an ISSG process}. Furthermore, the ISSG process of You and Wang meet the structural and methodological limitations of this claim, thus they would (as an obvious consequence) also exhibit the same functional characteristics (i.e. generates short lived oxygen radicals whose reactivity extinguishes before the short lived oxygen radicals are able to permeate as deep into the ONO-type memory cell stack and oxidize materials therein as would the reactive oxygen of a High Temperature Oxidation (HTO) process applied to an essentially same ONO-type memory cell stack).

Regarding claim 12, You and Wang fails to disclose a height variation ratio is about 1.20 or less. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the combined process of You and Wang by selecting a suitable thickness/height ratio in order to achieve a specific sidewall dielectric, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges for result effective variables involves only routine skill in the art. In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Moreover, the specification contains no disclosure of either the critical nature of the claimed process/device (i.e. - thickness/height ratio) or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen limitations or upon another variable recited in a claim, the Applicant must show that the chosen limitation are critical. *In re Woodruff*, 919 F.2d 1575, 1578 (Fed. Cir. 1990).

Regarding claims 13 and 14, as recognized by one skilled in the art that a larger erase speed is obtained in a memory cell after formation of the sidewall dielectric by the dry ISSG process {See Fujimoto et al. (US Pat. 6,830,973); col. 7, lines 32-38}. Note that the ISSG process of You and Wang meet the structural and methodological limitations of this claim, thus they would (as an obvious consequence) also exhibit the same functional characteristics.

Response to Arguments

2. Applicant's arguments filed 03/16/06 have been fully considered but they are not persuasive.

3. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). You et al. teaches subjecting the sidewall of the ONO-type memory cell stack to a thermal oxide process to form a sidewall oxide but does not mention the specific details such as the volumetric flow ratio of the H_2: O_2 as recited. Therefore, one of ordinary skilled in the art is motivated to use a known volumetric flow rate such as the rate taught by Wang et al.

4. Applicant argues that "Nowhere does You teach or suggest a quickly extinguishing oxidizing agent as a supplemental or alternate method to his nitrogen-containing, protective film" (see page 8 of the Remarks) or "Wang discusses ONO stacks (see Abstract) but does not teach or suggest use of a quickly extinguishing oxidizing agent for reducing Birds Beak in ONO stack after three or more layers of the ONO stack have been formed so as to be exposed at a sidewall" (see page 9 of the Remarks). However, these arguments are not commensurate with the scope of the claim. Moreover, You et al. teaches "a significant bird's beak is not formed at the ends of the ONO layer 108 during a successive oxidation process" (col. 6, lines 15-16). Furthermore, Applicant argues 35 U. S. C. 102(e) as regarding the rejections under 35 U.S.C. 103 (a), in response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

5. Applicant also argues that the flow rate of claim 1 being met by Wang is speculative logic. This argument is not convincing because Wang teaches that the ratio of H_2/H_2+O_2 can be 0.1%. Using this equation to calculate H_2/O_2 results in a value of 0.01 which thus satisfies the claim (less than 0.2).

6. Regarding claims 11, Applicant argues that "neither of You and Wang suggests that a dry ISSG be applied to a stack sidewall having further exposed thereat its, second silicon nitride layer". However, this argument is not persuasive. Noted that the structure and number of ONO layers (SiO-1/ SiN-2/ SiO-3) (Please refer to specification, figs. 3A-3C) of the present invention is the same as You's device (ONO layers 108 is comprised oxide 105a/ nitride 106a/oxide 107a; see fig. 2C).

7. Applicant argues that the rejection reliance on *In re Aller* and *In re Woodruff* is misplaced. It should be noted that the flow rate is a recognized result-effective variable as evidenced by Wang et al. (see [**0032**]).

8. Finally, regarding claims 13 and 14, Applicant argues that no evidence has been provided to show the claimed limitations. This argument is not convincing because the features are an obvious consequence of the combination as described in the rejections, and to merely argue that the references do not teach these limitations is not properly shifting the burden of proof. The combination of references in the rejections teaches the same structure and process thus as an obvious consequence have the same characteristics as the presently claimed invention.

Furthermore, Fujimoto et al. (US Pat. 6,830,973) was provided showing evidence to support the obviousness statement (i.e. in effect obvious consequence is equivalent to inherency).

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Vu whose telephone number is (571) 272-1798. The examiner can normally be reached on Monday-Friday from 8:00am to 5:00pm. If attempt to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith S can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR, Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DAVID VU
PRIMARY EXAMINER